

Low. In relation to these types the following typical surfaces of discontinuity were distinguishable: 1. *Near the surface*.—These appear frequently on the front side of secondary depressions and are related to the shallow cold strata which are separated from the upper warmer current by an abrupt change in temperature. 2. *Inversions with Fr. Nb.*—The mean altitude of these clouds is about 600 m. below the main cloud mass and they are often accompanied by small inversions. With more observational data it would be interesting to investigate the relationship which this condition bears to the Bjerkness theory of surface discontinuities. An inversion was found directly below the main Nb. layer in only 2 cases. 3. *Inversions in the main Nb. layer*.—Slight irregularities are frequent here especially at the beginning and ending of precipitation. 4. *Inversions at the upper limit of the clouds*.—These occur only with relatively thin Nb. from which there is only moderate precipitation, most frequently above 3,000 m. in the A. Cu. level. An adequate explanation of any of the above general classes is hardly possible from the records of only one aerological station.

The author gives in tabular form the percentage frequency of wind direction up to 4,000 m. during the occurrence of precipitation. The predominating direction is west for all heights. The striking characteristic is shown that especially in southern Germany winds with a N-component greatly predominate over winds with a S-component during the occurrence of precipitation. In the Alpine forelands all winds from SE-W have more or less of the foehn character, while those blowing toward the mountains necessarily produce phenomena associated with the forced ascent of air currents. It was found impossible to classify these records according to definite pressure types since in 80 per cent of the cases there was found to be an irregular pressure distribution in which secondary depressions played an important rôle. This latter fact reveals the difficulties in the prediction of precipitation for this region.

Discussion.—The reference by the author to the decrease in the mean relative humidity up to over 4,000 m. and his inference therefrom relative to the supposition that the descent of air from higher altitudes is the cause of its dryness, etc., might lead the reader to suspect some undue influence of local character, since these observations were made near a lake. It therefore would seem of interest here to show the results found for the southeast quadrant of anticyclones in this country as determined from kite observations made at the Drexel Aerological Station near Omaha, Nebr., from 1915 to 1924. These are given in the following table and are based on 50 and 61 flights made during the summer and winter seasons, respectively:

Altitude (m.)		Surface 395	500	1,000	1,500	2,000	2,500	3,000	3,500	4,000	4,500	5,000
Relative humidity.	Summer...	78	72	62	57	50	45	45	43	39	40	44
	Winter....	89	89	82	67	59	57	56	54	52	51	50

These data represent the ascent only, the average time of which occurred about 7 a. m. and 8 a. m. for summer and winter, respectively. This fact, of course, explains the rapid decrease in the lower levels from the relatively high values found at the surface. It is probable that the same method was used for the European data since this rapid decrease is even more pronounced than for Drexel.

This latter fact, however, may be due in part at least to the proximity of the lake. While it is true the European observations were not made under the same conditions so far as the pressure distribution is concerned, yet the American observations were made during conditions favorable for cloudless weather and the downward movement of air. It is evident from this table that under similar circumstances in this country the same condition prevails, viz, a gradual decrease in the mean relative humidity with increase in elevation.—L. T. S.

SUNSPOTS AND THE WEATHER AT GALVESTON, TEX.¹

By I. R. TANNEHILL

[Weather Bureau office, Galveston, Tex., May 25, 1925]

The chief difficulty in coordinating solar and terrestrial conditions lies in the absence of complete series of observations on solar activity. Present observations of that nature cover too short a period to yield permanent results.

The variation in the number of sun spots as related to the weather on the earth has been the subject of numerous studies most of which probably are familiar to the reader. In some of these investigations it is assumed that the effect of changes in solar radiation will be felt throughout the atmosphere, as a general rise or fall in the temperature of the atmosphere as a whole, the effect being greatest in the Tropics. Others have assumed that the changes in the earth's atmosphere will be felt chiefly in the higher levels of the troposphere, that these changes will entail other changes in the surface pressure of the earth, etc. Still others claim, and with reason, that the correlation coefficients will be negative in one region and positive in another.

The writer presents in outline the results of studies of the records of a single station in an effort to associate changes in the spottedness of the sun with terrestrial weather changes.

The wind.—Data of frequency of south and southwest winds in summer months, 1871–1924, smoothed by taking the mean of three consecutive values allocated to the middle year were compiled and plotted in a curve. A curve was also prepared showing the changes from year to year in the frequency of southeast winds for the month of July. This curve is practically the inverse of the curve for south and southwest winds.

There is a rough parallelism between the frequency of south and southwest winds and the curve of sun spots, although the curves for the two elements are at times lacking in synchronism.

Wind velocity data for April and May, the two months best suited to the purpose of the investigation, were prepared and studied. No correction was attempted for the results of a change in the anemometer exposure made in 1901.

An increase in wind velocity with increase in sun spots is noted in four periods between 1880 and 1920, although here again the two curves are not closely congruent. The wind speed for July—a month in which accidental changes in wind speed are at a minimum, by reason of the small number of cyclones which approach within 500 miles of the station—is shown by two curves, the first representing the changes from year to year in the wind speed at the hour of least wind movement, near sunrise, and the second representing the changes for the hour of greatest wind speed, or the converse of the first.

¹ Author's abstract. Original text and illustrations are filed in Weather Bureau Library.

The relation of these two curves to the sun-spot curve is not clear.

The temperature-relation.—A variety of material was collated to illustrate this relation and the conclusion was reached that the reaction of terrestrial temperature to solar changes due to variations in the spottedness of the sun is quite complex and that there are apparently other influences not fully understood.

The rainfall relation is likewise not obvious. I conclude as a final summation of the results of the study:

(1) There are some striking resemblances between the curves of weather elements and that of sun spots, but with numerous irregularities of short period not removed by the smoothing processes.

(2) The change in weather conditions frequently precedes the change in sun spottedness which leads to the inference that they are not related as cause and effect.

(3) There is some evidence that the effect of solar variations differs with the season and the locality.

(4) The problem is quite complex and the meteorological records are of inadequate length for the purpose.

MILD WINTER OF 1924-25 IN BERLIN

Dr. G. Hellmann in the April, 1925, number of the *Meteorologische Zeitschrift* briefly summarizes the winter of 1924-25 in Berlin. That winter, counting from December 1 to February 28, as usual, proved to have been the third mildest in the last 160 years, the winter of 1795-96 only being milder and the winter of 1868-69 being almost exactly as mild; the latter, however, was broken by a ten-day cold period in January. An unusually warm February—about 4.3° C. above normal—was common to both winters. * * * The temperature in 1924-25 ranged from -7.5° to 15.3° C. (18.5°-59.5° F.).

The winter belongs to the dry-mild type and this type occurs less frequently than the wet-mild type.

Doctor Hellmann notes that the usual spell of inclement weather which usually follows a very mild winter was not lacking.

Here in the United States, although February was exceptionally warm, both March and April were devoid of unseasonable weather.—A. J. H.

THE NATIONAL ELIMINATION BALLOON RACE FROM ST. JOSEPH, MO., MAY 1, 1925

Extracts and notes based on a report by W. S. Belden, United States Weather Bureau, St. Joseph, Mo.]

The National Elimination Balloon Race in 1925 started from the aviation field in St. Joseph, Mo., late in the afternoon of May 1. Five balloons were entered in the race.

At St. Joseph, May 1 was clear with temperature considerably below normal, ranging from 39 to 62 degrees. Northwest wind prevailed from 3 p. m., April 28 to 8 p. m., May 1. The wind attained gale force on the forenoon of the 29th and was light to fresh on the 30th and 1st, the maximum velocity for a period of five minutes on each of the last two dates being 24 miles per hour from the northwest. The wind on the afternoon of May was rather gusty, the extreme velocity covering a period of two to three minutes of each hour from 1 to 6 p. m. being at the rate of 23 to 25 miles per hour.

Each pilot was furnished detailed meteorological reports and charts based on aerological observations made at 12 well distributed stations on the afternoon of

April 30 and at 7 a. m. and 11 a. m., May 1. Numerous pilot balloon runs were made May 1 at the local aviation field by the United States Army meteorological service. Other information furnished by the Weather Bureau included daily weather maps, daily weather bulletins, forecasts for Missouri, Kansas, Nebraska and Iowa, a special weather summary and indications issued by the district forecaster at Chicago, based on special noon observations May 1, and schedules of radio broadcasts for the benefit of the contestants, three of which carried radio receiving sets. Forecasts and summaries of upper air conditions were broadcast for the benefit of the pilots at intervals during the time the balloons were in the air. These radio bulletins were prepared by the Weather Bureau at Washington and Chicago and sent by telegraph to a number of broadcasting stations that were most favorably located with respect to the probable path of the balloons.

On starting, the balloons were carried to the south-southeast. Those rising to higher levels within a few hours after starting moved more in a southeasterly direction and at a greater speed than those keeping nearer the ground. The courses of all the balloons were the results of winds flowing from a ridge of high pressure which extended from Canada to the Gulf of Mexico. The winning balloon, piloted by Mr. W. T. Van Orman, aided by Mr. C. K. Wollam, landed near the town of Reform, Ala., exactly 36 hours out, and 585 miles from St. Joseph.

OROGRAPHIC WIND AS AN AID TO GLIDING FLIGHT IN AIRPLANES

The remarkable development in man's ability to take advantage of the upthrust of air over ridges for prolonged gliding flight, is shown by the report (*Aviation*, April 20, 1925, p. 439) of the achievements of Lieutenant Thoret and a pupil of his, both of the French Air Service. In 1923 Lieutenant Thoret remained in the air for 7 hours, with his engine completely cut off. Sergeant Wernert recently glided for 9 hours and 17 minutes in the same manner. On the day when he established this record, a high wind was blowing across the ridge which is the scene of the soaring tests, developing, as nearly as can be inferred from the description, a standing wave about 2 km. wide and 4 to 5 km. long over the ridge. Along the crest of the ridge Wernert glided at some 50 to 300 yards above and in front of it, "at all times maintaining a great reserve of flying speed. He tacked up and down in front of the hill all day" and finally toward sunset, the air becoming disturbed in a manner ascribed to cooling of the air in the shadow of the hill, soaring flight became increasingly difficult. "A perfect landing was made by moonlight."—B. M. V.

METEOROLOGICAL SUMMARY FOR APRIL AND MAY, 1925, FOR ARGENTINA, CHILE, PARAGUAY, AND BOLIVIA

[Reported by Señor Julio Bustos Navarrete, El Salto Observatory, Santiago, Chile]

April.—During April the weather was rather rainy in all of the southern part of the continent, while in northern Argentina and in Uruguay it was generally of the type occurring with the domination of high atmospheric pressure. On the Bolivian plateau there were days with severe cold, and frosts were frequent.

On the 2d and 3d scattered rains fell in Argentina.

The first important cyclonic depression appeared on the 5th; it controlled conditions in central and southern Chile,